EB120

Advanced Ethanol Boiler

Allard Research and Development

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FOREWORD

Thank you for purchasing the Allard Research and Development EB120 – Advanced Ethanol Boiler. Please take the time to read these instructions before you begin as they contain important information about the installation and maintenance requirements, as well as safety instructions.

The EB120 is shipped with our intelligent remote control unit (the EB-A Controller), and a custom temperature probe. With this remote, not only can you control the temperature and time duration of your production run, but also control an external 120V 5A pump. The remote also allows for the manual operation of the drain valve, a key-lock, and allows the selection of Fahrenheit or Centigrade for the temperature reading; as well as displaying the EB120's status via the 8 LEDs. Note also that one remote control unit can control multiple EB120 boilers.

Every EB120 Advanced Ethanol Boiler is thoroughly tested before leaving the factory so there may be small amounts of water inside the boiler when you receive the unit.

IMPORTANT

★ Read this manual before installation and operation.
★ This equipment must be installed by competent person.
★ Disconnect the power supply before exposing electrical connections.
★ Confirm the right voltage to the system.
★ This product is never to be operated by persons under the age of 21.
★ Ensure that you have obtained the proper permits before use.
★ Keep accurate and detailed records of your use of the EB120, and the ethanol produced.

SAFETY PRECAUTIONS for ethanol production

★ Do not smoke near the EB120, especially during operation.
★ Never operate the EB120 without the safety pressure relief valve installed.
★ Always ensure there is no blockage to the steam outlet line, or through the still.
★ Always operate the system in an area with plenty of ventilation.
★ Use caution, as the steam outlet, connecting pipes, and your still will reach high temperatures.

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Chapter One : Specifications

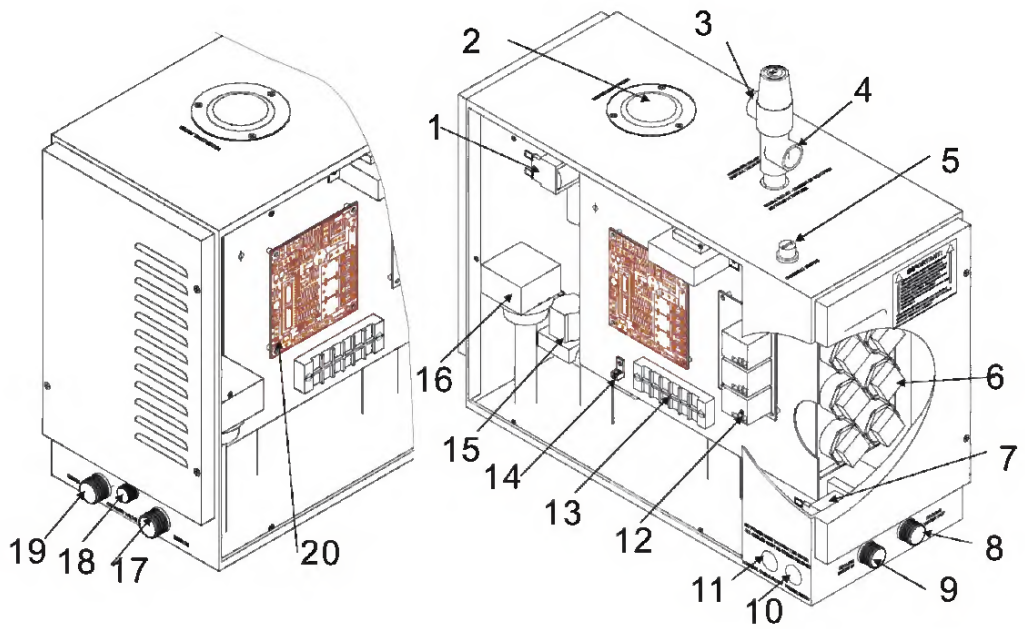
Model	Power (kw)	Voltage (V)	Phase (N~)	Current (A)	Dimensions (W×W×H)
EB-120	12.0	230/400	1/3	52./17	20"×8.25"×19"

1. Parameters and dimensions of EB-A controller (chart 2)

Model	Timer Range (minutes)	Temperature	Dimension(mm) L*W*H	Remarks
EB-A	15-240	173 F	5.75"×3.5"× 1"	When the time widow displays "Long" the boiler will operate continuously until it is switched off.

Chapter Two: The EB120 Advanced Ethanol Boiler.

Parts description



No.	Part	Description
1	ElectroMagnetic solenoid	Automatically controls the beer in
2	Water level probe	Detect the water level
3	Pressure relief valve	Operates if the pressure in the boiler exceeds 1.2kg/ **c** m^2
4	Steam outlet	Steam outlet
5	Overheat switch	Boil dry protector operates at 105℃

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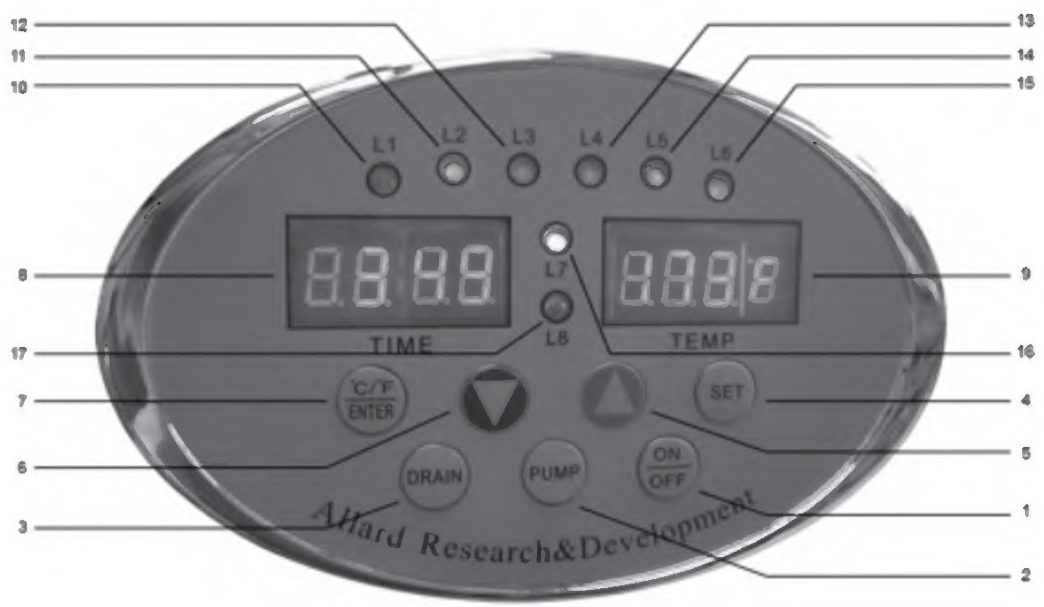
6	Heat element	Heat element
7	Proportional Solenoid	Automatically controls the cooling water flow
8	Cooling Water Out	Output that connects to the Still cooling water input
9	Cooling Water In	Connections for the cooling water output
10	Power entry	The rout of power wire
11	Control cable entry	The tout of control cable
12	Accessorial circuit board	Connect and control the heat element
13	terminal	Connection for power supply
14	Earth wire plug	Connection for earth wire
15	Drain valve	Drain valve
16	Pump	Pump
17	Beer in	Connect to pump for beer iput
18	Exhaust valve	Exhaust valve
19	Drain outlet	Outlet for drain
20	Main circuit board	Control center

Parts description of EB-A controller.



No.	Part	Description
1	On/Off	Turns the system On and Off
2	Pump	Operates an external (user supplied) pump

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3	Drain Control	Operates Drain, and used to set Cooling Water Flow Rate
4	Set	Preset Run Time and Distillation Control Temperature
5	△	Increase button
6	▽	Decrease button
7	C/F & Enter	Enter Key. Also change from Fahrenheit to Centigrade
8	Time display	Displays the remaining time of the boiler operation
9	Temp display	Displays the detected temperature of distillation column
10	L1	Beer Input pump operating
11	L2	Cooling water inlet in operation
12	L3	Indicator LED for draining green is for auto drain, red is for manual drain
13	L4	Overheat Indicator
14	L5	Tank Overheat Indicator. Red means the boiler was cut off as the heating elements are too hot (usually because of a lack of beer input)
15	L6	Cooling water proportional valve operation indicator
16	L7	Indicates the detected temperature is lower than the preset temperature and boiler is heating.
17	L8	Indicates the detected temperature is higher than the preset temperature and the boiler is in idle mode.

Chapter Three: Installation

★ Disconnect all power before installation.
★ If the boiler is installed in an inaccessible place, ensure that the electrical power, beer supply, and water supply can be easily turned off in an emergency.
★ The minimum water inlet pressure is 3.6 psi (0.25 bar) and the maximum is 30 psi (2 bar), for pressures in excess of this, use an inline pressure regulator before connecting to the boiler system.
★ The steam pipe from the boiler to still should be kept to a minimum, pipes longer than 10 feet (3 meters) should be insulated to prevent heat loss. Steam pipes will be hot during use and must be protected against accidental contact.
★ Keep the number of right angle bends to a minimum and ensure that the run of does not create a trap into which condensate would gather and cause a blockage (i.e. the pipe must not go down and then up).
★ There must be no valve or other blockage in the steam pipe
★ The steam pipe should be metal of other material that can withstand a constant 350 degrees F (150°C) temperature. Stainless Steel or Copper pipe is recommended. Do not use pipe that can rust.
★ Do not permanently install the EB120 system outdoors. It can be used outdoors, but must be stored inside and protected from the weather. The unit is not weatherproof.
★ Do not use the EB120 inside your house. A garage with the door open is fine, but never inside the living area.
★ The EB120 should be level side-to-side and front to back and should be installed so that the arrows on the case point up.
★ Do not install or operate the EB120 in close proximity to flammable or hazardous substances.

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Beer, Water, and Steam connections

a. The water supply pipe and steam pipe should comply with local standards.
b. Connect the cooling water inlet of the EB120 to the main water supply using a flexible hose with 3/4-inch fittings. Washing machine connection hoses are perfect for these connections, as they are made to withstand high pressure without bursting. We recommend braided stainless steel washing machine hoses, available at your local building supply store.
c. Connect the Cooling Water Out to the water input of the distillation. These connections should also be made with either rigid copper pipe (at least ½ dia), or flexible washing machine hoses.

d. Steam outlet (3/4 inch) use the same dimension Stainless Steel or Copper pipe to connect to the Distillation Column. During use the steam pipe will be very hot and must be protected against accidental contact. Note that according to the location it may be necessary to attach an additional length of pipe to the pressure relief valve in order to divert the steam flow to a safe direction should the valve operate.
e. Connect the drain outlet to a suitable drain via a copper pipe with the appropriate fittings.

Installation of controller and temperature probe.

EB-A controller is waterproof and can be installed anywhere within close proximity of the distillation system.

(1) Ideally the control panel should be installed at a height of approximately 5' for ease of use.
(2) Installation method: drill a 1.5" (40mm) hole on mounting surface. Open the front cover of steam EB120 and connect the control cable (6 pin) and temperature sensor cable (2 pin) to the relevant ports.
(3) Control panel installation: connect one end of the control cable to circuit board port in the boiler, and connect the other end to the controller.
(4) Temperature probe installation: the temperature probe is installed into the distillation column at the control temperature point. This varies according to the size and type of still being used. This probe would be installed in the location normally used for a dial thermometer. The temperature probe has ½" male FIP fittings.

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EB120 Temperature Probe

Installations of power supply and control cables

1. Confirm the correct voltage of power supply and wires.

2. Remove the knock out for the power cable entry and use a rubber grommet to protect the cable, connect to the conductors to the correct terminals – for single phase power supply use the copper bridge connectors, for 3 phase supply remove them.

3. Remove the knock out for the control cable entry and use a rubber grommet to protect the cable, connect the cable to the relevant port on circuit board.

4. Ensure the power supply wire and control cable remain separated to prevent magnetic field of power supply wire from disturbing control cable signal.

For typical electrical connection in single-phase 220-volt operation, bridge the L1, L2, and L3 terminal connections together, and connect the AC Hot wire to one of the L connections. Next, bridge the 3 neutral (N) terminal strips together and connect the AC neutral to one of the N connections. Last, connect the electrical ground to the ground terminal on the EB120 case.

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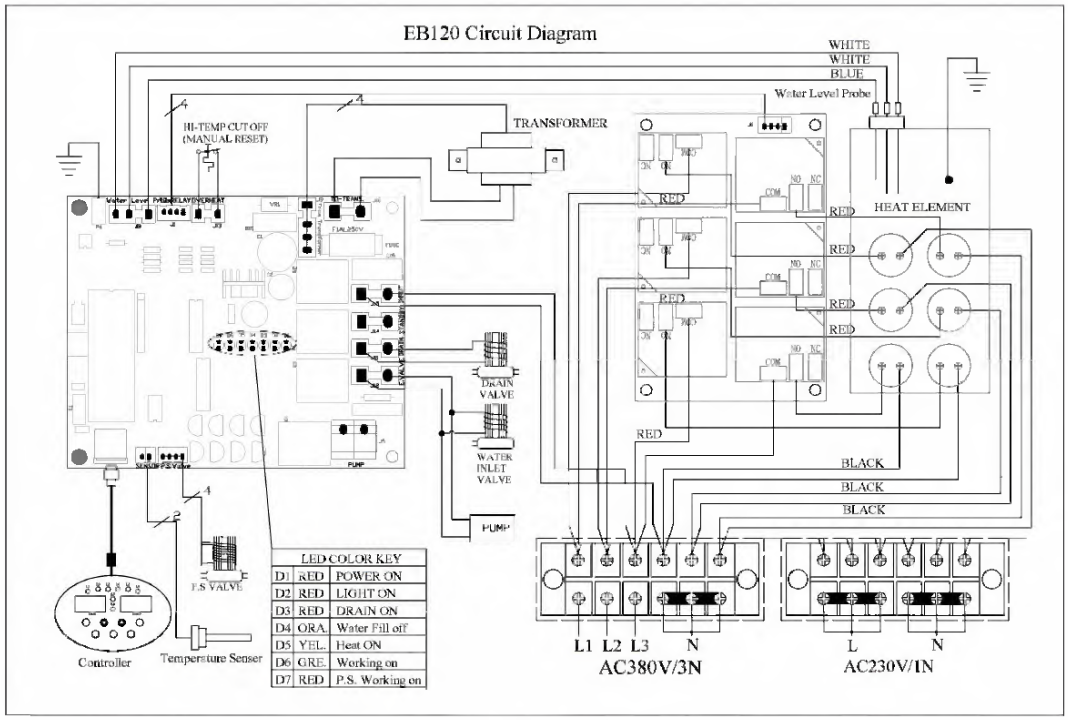

EB120 Circuit Board

Chapter Four : Testing and operation

(1) Once the installation has been completed and checked, turn on power and water supplies and carry out the following test.

(2) On the control panel press the on/off key, (the key has a time-lapse function, press it for I second), the time and temp displays the data.

(3) Turn on your valve(s) to allow beer to flow to the boiler. The indicator LED is red on the remote. The internal pump will begin filling the boiler with beer. When the beer level rises to the low beer level sensor level the elements switch on and the heating indicator LED turns on. Several seconds later when the high beer level sensor is reached, the internal pump will stop, and the indicator LED changes to green.

(4) After a few minutes of heating, the unit will begin producing steam.

(5) Press the on/off key again to turn off the system. There will be no data on display and the boiler will stop.

(6) Press the on/off key once more (temp and time display again), and after a few seconds the boiler will begin producing steam again. Let the boiler operate for a short while - the beer level will fall to the low beer level. Check that the internal pump automatically starts (the pump indicator LED (L1) becomes red). The pump indicator LED will go back to green when the boiler tank is full.

(7) The time display counts down to show the remaining time, when it reaches 0 the boiler will stop heating. The run time can be adjusted, or overridden to run continuously.

(8) 5 minutes after the system has been turned off, it will automatically go into the drain-down cycle. The

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drain valve opens (drain indicator LED green).

(9) You can also drain the boiler manually by pressing the drain key when the system has stopped heating. The drain indicator LED will indicate as red during this operation.

(10) Once you have set the temperature required, the boiler will operate on all heating elements until the temperature is 4 degrees below the target temperature. Once the system is in full operation, the computer maintains the boiler temperature and it will selectively turn on or off heating elements as required. This approach helps to minimize the power consumption during operation.

(11) The pump switch on the remote operates a relay on the EB120 circuit board. This can be used to control an external pump in your system. The maximum voltage that can be used through this relay is 120V, 5A.

(12) Use the Enter key to change the temperature display between ℃ and ℉ and also to confirm the time and temperature setting.

Setting Time and Control Temperature

When the EB120 leaves the factory the default settings are 173 degrees Fahrenheit and 4 hours of operation. These can be adjusted as follows;

(1) Time setting : press "set" key – the time display will flash - press "△", "▽" to adjust the time, each press will increase or reduce 5 minutes. Once the desired setting is reached, press "enter" to accept, and the time display will stop flashing. You can adjust from the time from 15 to 240 minutes, or operate the unit with no time limitations or continuously. Note the controller has a memory function, and if the power cord is not disconnected, the next time you turn on EB120, the time you selected will be the default time.

(2) Temperature setting: if you press "set" once after you finish setting the time or otherwise twice the temperature display will flash, enter the required temperature by pressing "△", "▽" to adjust - every press will increase or reduce 1 degree. Once the required temperature has been set, press the "enter" key and the temperature display will stop flashing.

Steam on Demand function

To activate the steam on demand function, first preset the desired control temperature as described above, then press and hold the drain key for 5 seconds, L4 will turn red and the time displays "LONG" indicating that steam on demand is operational.

Once the steam on demand function has started, the unit will operate for 30 minutes, and then stop until the function is started again.

Note that the auto drain function will operate every time the steam stops.

Adjusting the water flow control for the cooling coils in your distillation column

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The water flow control can be fine tuned to help tightly control the specific characteristics of your particular still, and can help regulate varying input water pressures. There are four different presets that can be chosen for use during operation.

To change the water flow rate control, turn on the EB120, and press and release the Drain key on the remote. The Temperature Display will flash and show one of four pressure settings; 1PS, 2PS, 3PS, 4PS.

Press the Drain key one or more times to cycle through the four choices. When you see the selection you want, press the Enter key to confirm. The Temperature display will stop flashing and return to displaying the temperature reading of the still.

Finally, you MUST now press the On/Off button and turn the EB120 off, then press the On/Off button once more and turn the unit back on. These steps are required to store the new setting, and to prevent accidental changing of the water flow rate to the still.

Chapter Five: Troubleshooting guide

Please note that we recommend all repairs are carried out be a suitably qualified person.

Trouble description	Possible Cause	Solution(s)
When the boiler is turned on there is no display on control panel.	Check: 1. Power supply 2. Transformer 3. Main circuit board 4. Controller 5. Control cable or port	1. Check power supply voltage. 2. If the indicator LED of power supply isn't on, then check transformer or power supply. 3. If the LED remains red, remove the controller turn off, reinstall the controller, and restart. 4. Change circuit board 5. Check the control cable port and controller.
System appears to be turned on, but the boiler is not heating.	Check: 1. Beer supply. 2. Beer pump operation. 3. Water level probe 4. Main board 5. Ground wire of boiler and circuit board 6. Heating control board 7. Heating elements	(1) Indicator LED for beer level is red. Check beer input supply (2) Check the connection of water level probe. (3) Check ground wire connection of circuit board and boiler. (4) Indicator LED for beer level is green. Check circuit board (5) Check if overheat switch is disconnected (6) Check heating elements
EB120 is turned on,	Check:	Possibly need to:

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control panel is normal, and indicator LED for heating is on, but there is no steam output	1. Main circuit board 2. Relay circuit board 3. Heating elements	* Change main circuit board * Change relay circuit board * Change heat elements
Temperature displays "LC"	Check: Beer level probe connection	Check connection or change beer level probe.
Temperature displays "HC"	Beer level probe detects a short circuit	1. Check beer level probe connection 2. Check controller for short circuit
Turn off EB120, and cooling water continues to flow through the system.	Check the proportional solenoid control valve	1. Try turning the system on and off again, or disconnect the system from the power connection, and reconnect. 2. Check proportional valve. Clean it or change it
Unplug from power supply, and cooling water continues to flow through the system.	Check: 1. Water inlet valve 2. Circuit board	Change circuit board or water inlet valve
Turn off EB120, but it continues to operate.	Check: f. Circuit board g. Controller h. Relays on accessory circuit board i. Water level probe	Unplug or disconnect the unit from power. DO NOT CONTINUE TO USE WITHOUT FIRST CONTACTING YOUR DEALER!

Chapter Six: Regular Use and Maintenance

The single biggest problem with boilers is the build up of scale resulting from dissolved solids within the beer. Scaling can cause the heating elements to fail, the beer level sensors not to function, and premature failure of the O-rings resulting in leaks from around the elements. The extent of the problem will vary according to the degree of impurities in the beer.

*** IMPORTANT NOTICE: DO NOT ATTEMPT TO RUN ANY MASH OR LIQUID WITH SUSPENDED IMPURITIES DIRECTLY THROUGH THE EB120 WITHOUT FIRST STRAINING AND FILTERING. DOING SO WILL CLOG THE BEER PUMP, SOLENOID VALVE, AND BOILER, AND WILL VOID YOUR WARRANTY. WE RECOMMEND PRE-SCREENING WITH A FINE STAINLESS STEEL SCREEN, THEN FILTERING WITH AT LEAST A 10-MICRON FILTER BEFORE ALLOWING YOUR BEER TO BE PUMPED INTO THE EB120.**

We also recommend descaling the boiler once every 50 to 100 hours of operation. To descale use a solution of weak acid crystals (such as citric acid) mixed with water. Citric acid crystals are available in packets for descaling

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kettles from most hardware stores, brew supply stores, and are available online from Allard Research and Development. Follow the instructions supplied with the crystals and allow sufficient time for the solution to dissolve the scale before flushing out the boiler.

System faults arising from a failure to descale the unit are not covered by warranty.

Because heating and cooling cause expansion and contraction, it is important to inspect all the water and steam inlets and outlets as well as their pipes and connectors on a regular basis to ensure there are no leaks. The condition of the wiring and electrical integrity of the boiler system should be checked regularly.

Warranty

The EB120 has a one-year warranty from the date of purchase. This warranty excludes consumable items such as the electrical heating elements. Failures resulting from misuse or abuse, such as a failure to descale as above, or using beer that has not been adequately strained and filtered, are not covered under the warranty.

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